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(54) **TWO-STAGE ROTARY COMPRESSOR**

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F04C 18/344 (2006.01)

(52) **U.S. Cl.** **418/11**; 418/13; 418/15; 418/148; 418/267; 418/268

(58) **Field of Classification Search** 418/11, 418/13, 7, 8, 15, 148, 248, 267, 268
See application file for complete search history.

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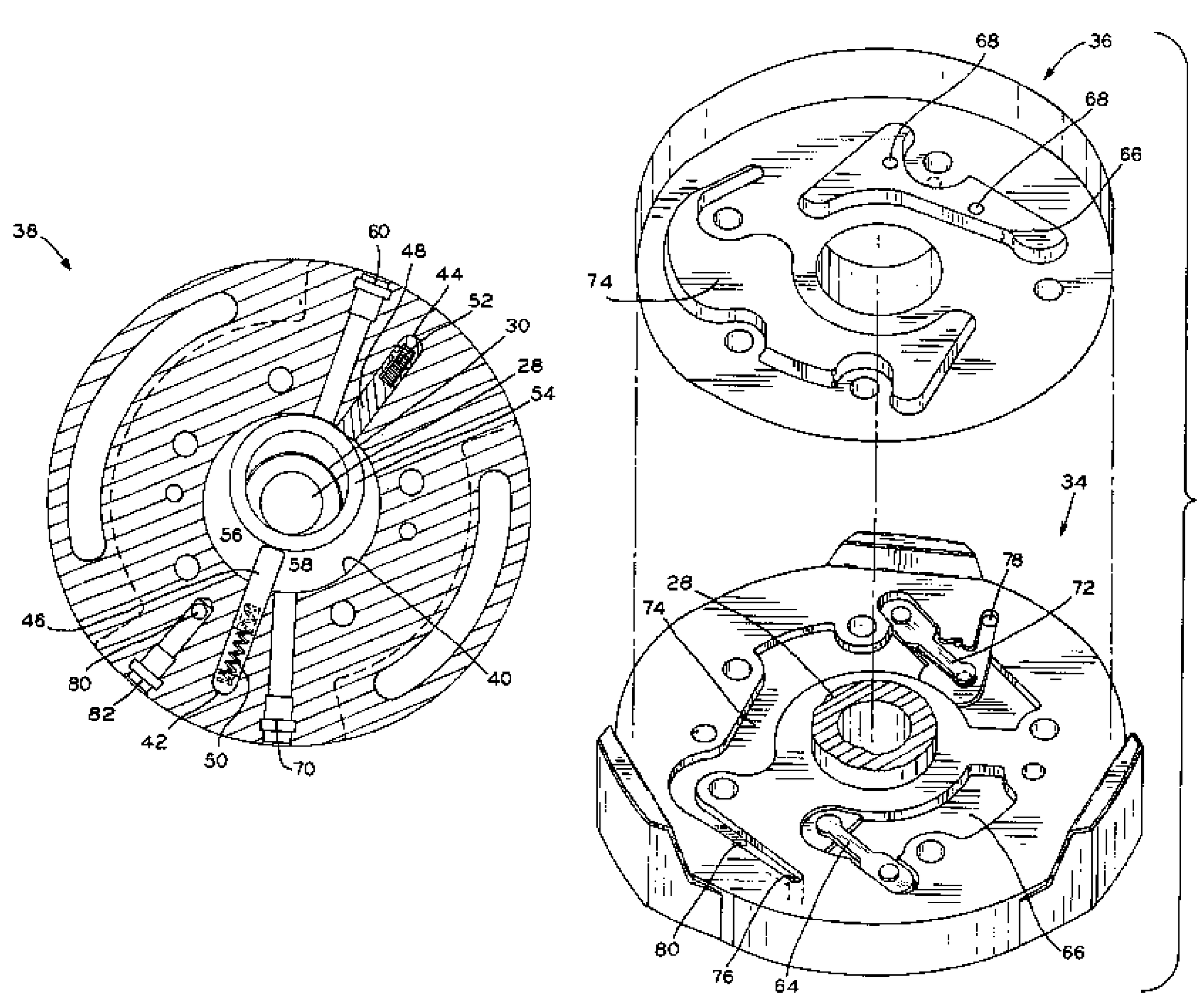
(57) **ABSTRACT**

A two-stage rotary compressor having a compression mechanism including a single muffler housing member. The single muffler housing member at least partially defines an intermediate pressure discharge cavity and a discharge pressure discharge cavity. In one exemplary embodiment, the compression mechanism includes a cylinder block having a plurality of vanes positioned within slots formed in an inner cylindrical surface of the cylinder block. The slots are in fluid communication with the discharge pressure discharge cavity and receive discharge pressure working fluid to bias the vanes radially inwardly. In another exemplary embodiment, the cylinder block includes a plurality of passages for the delivery of working fluid to and from the cylinder block.

15 Claims, 6 Drawing Sheets



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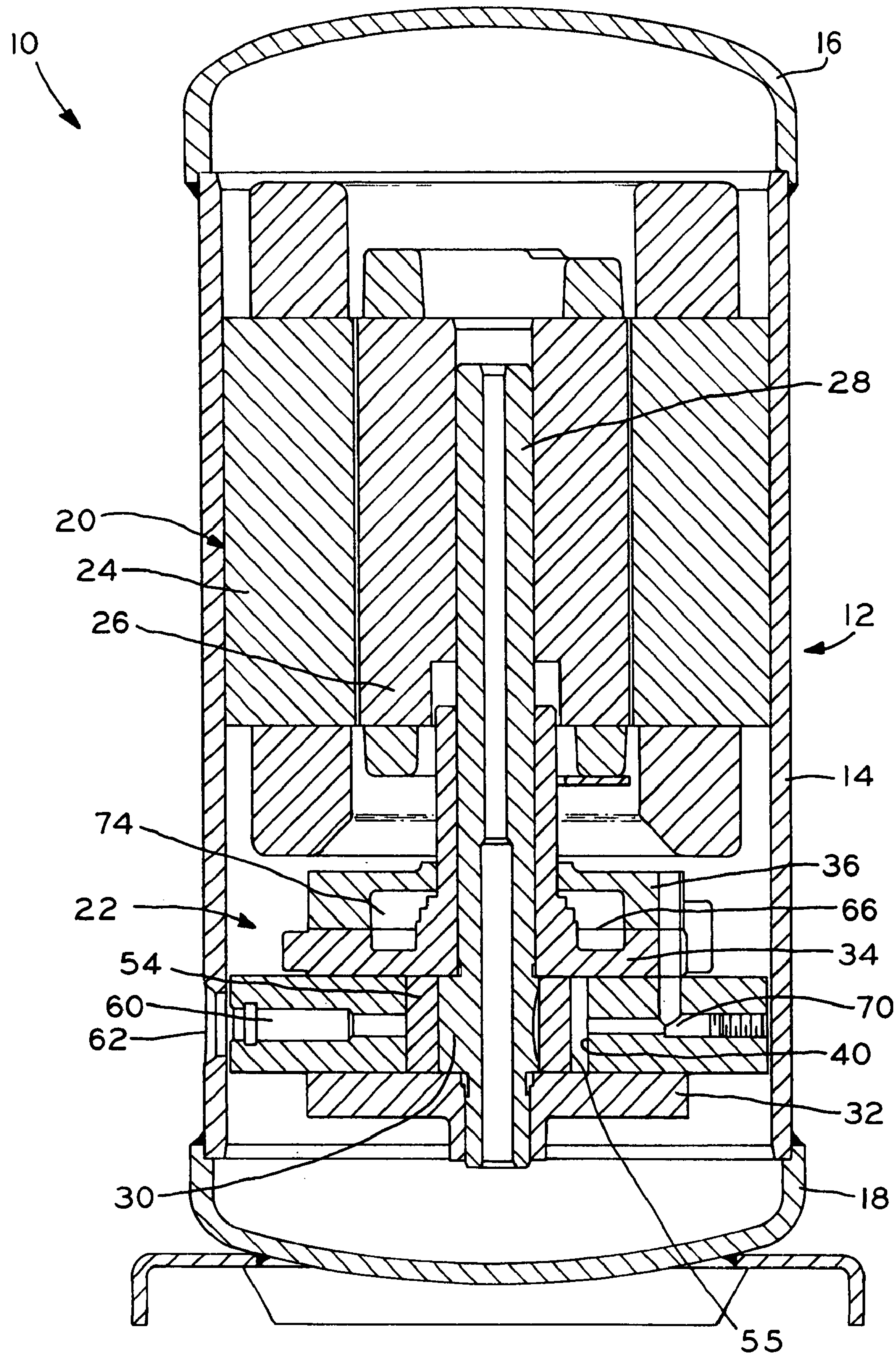

FIG_1

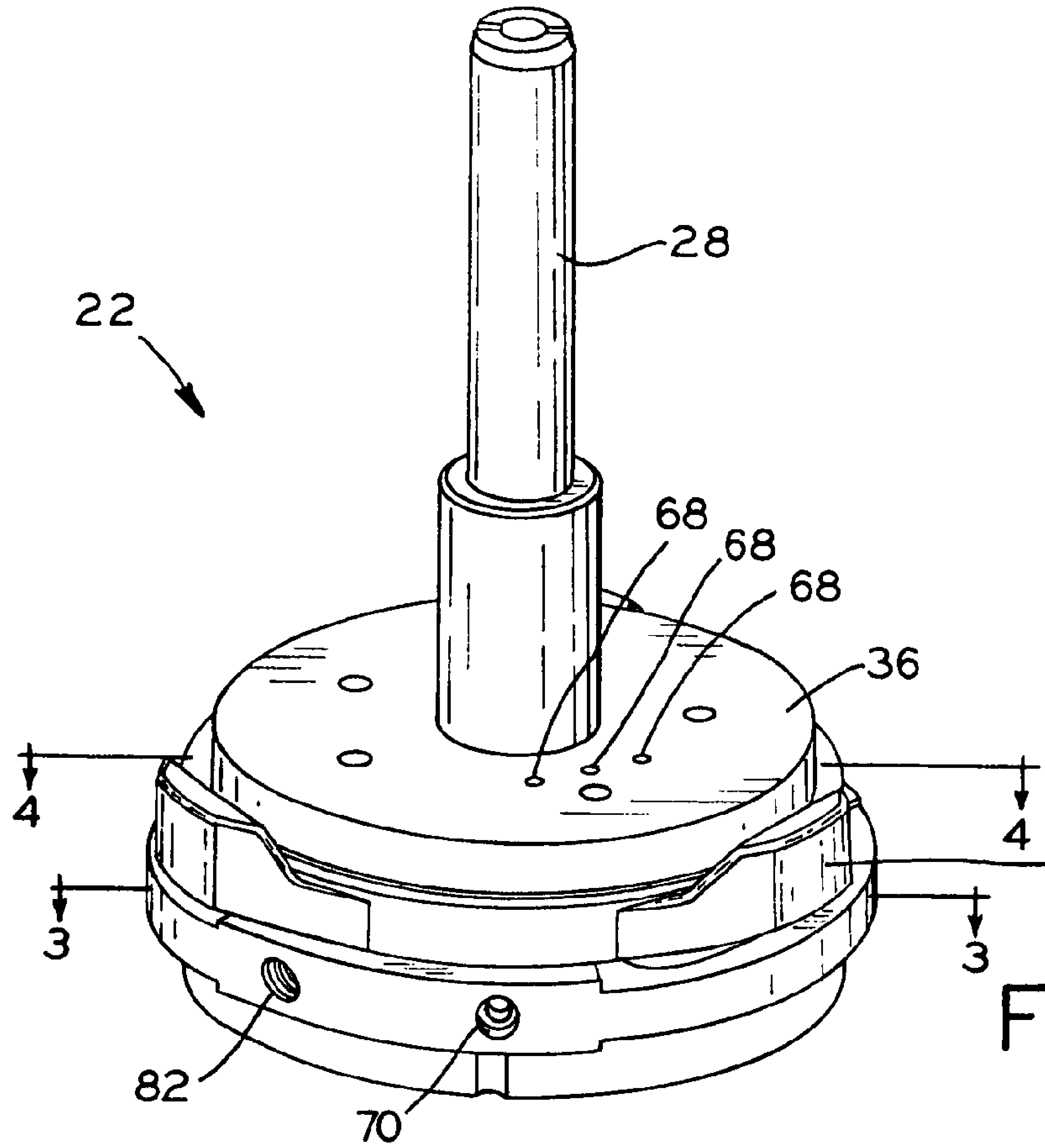

FIG_2A

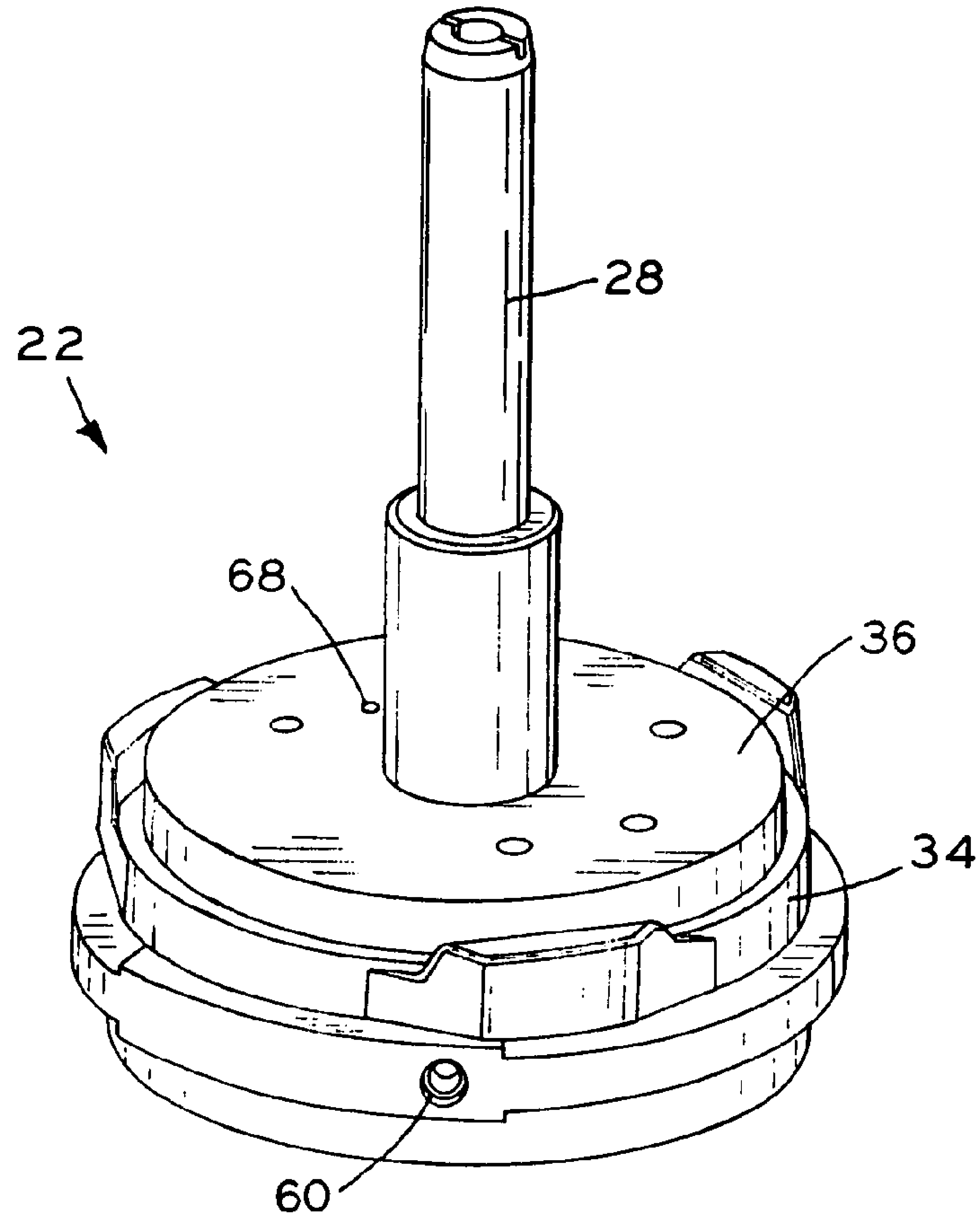

FIG_2B

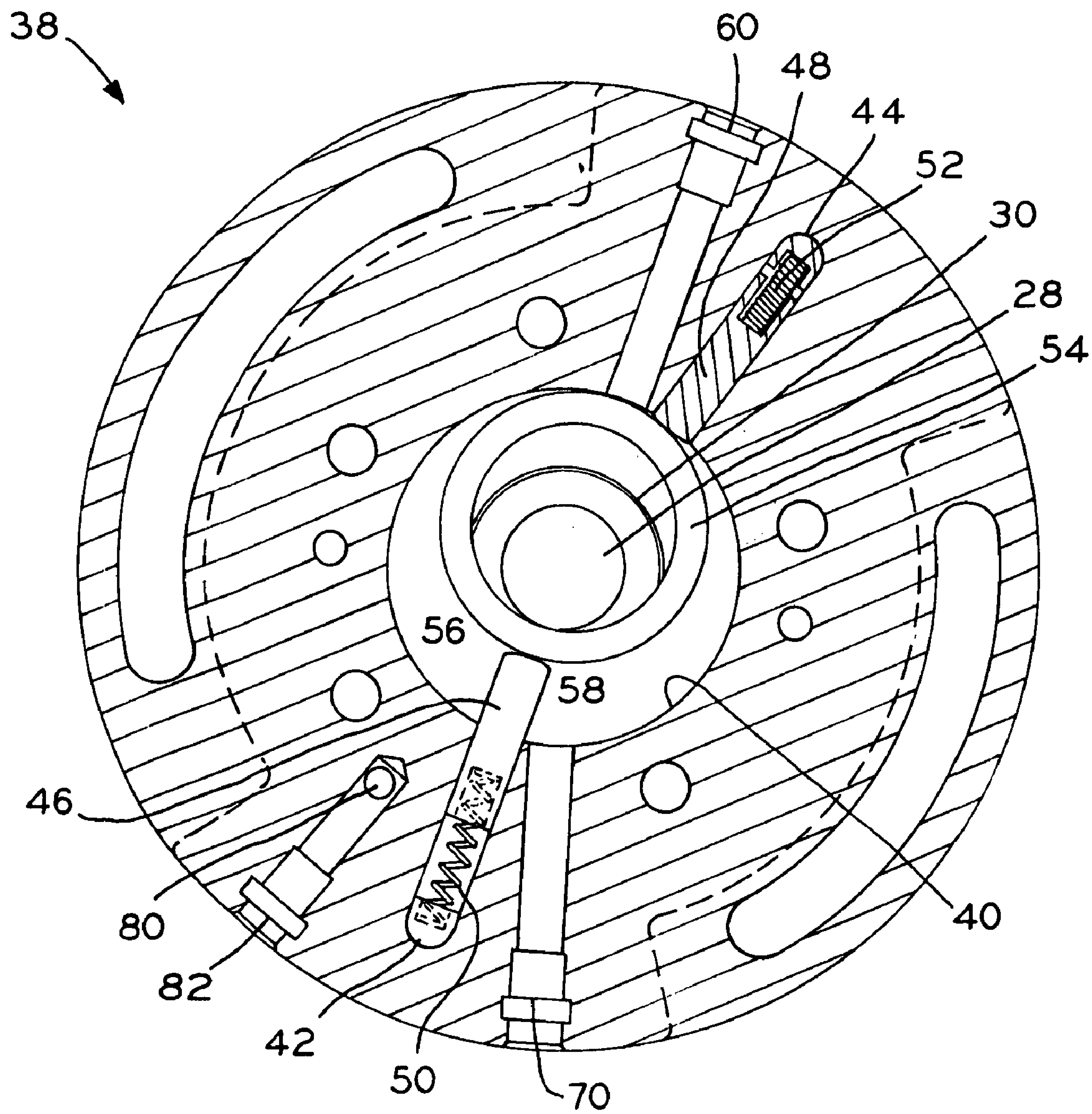

FIG. 3

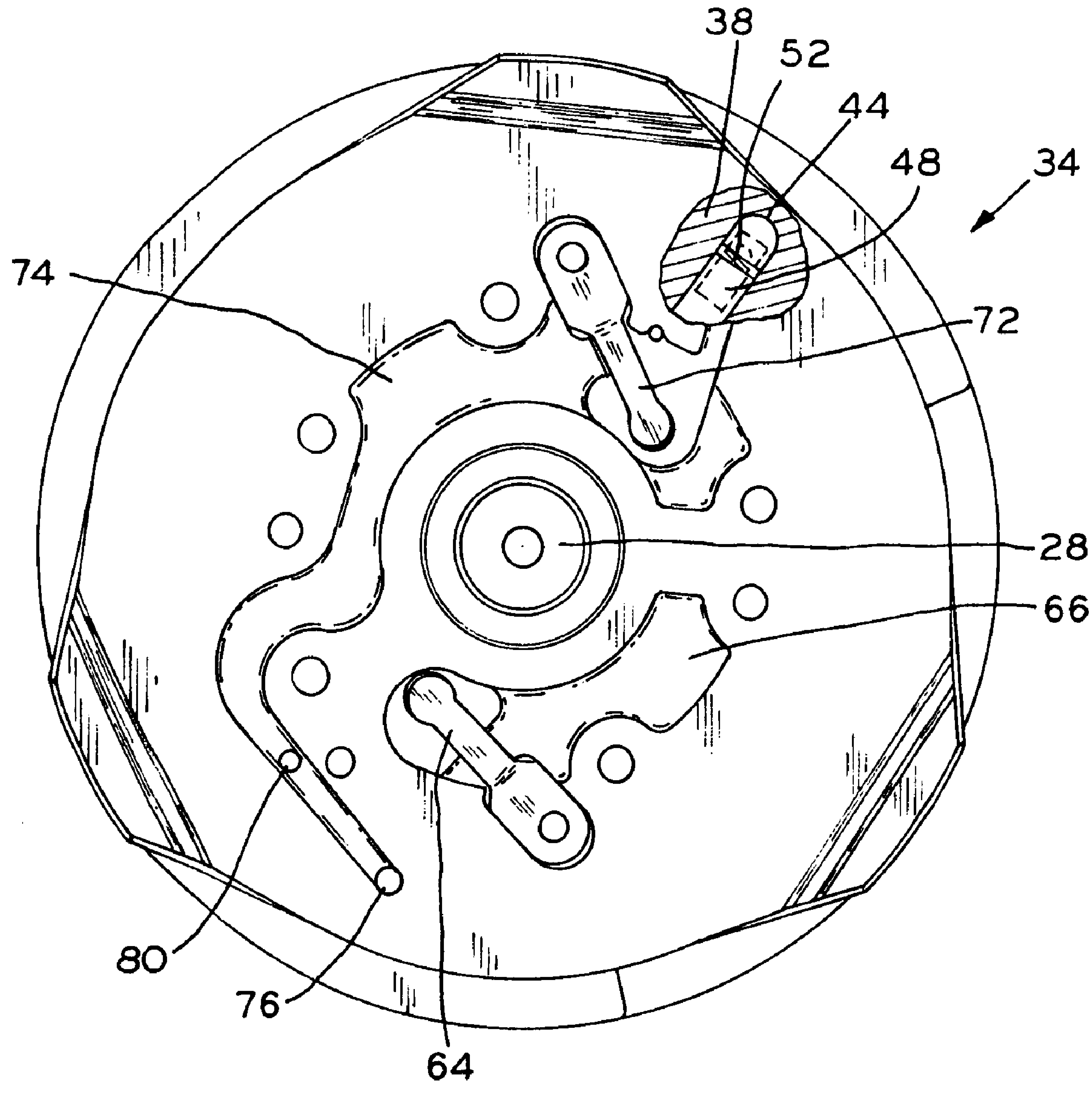

FIG. 4

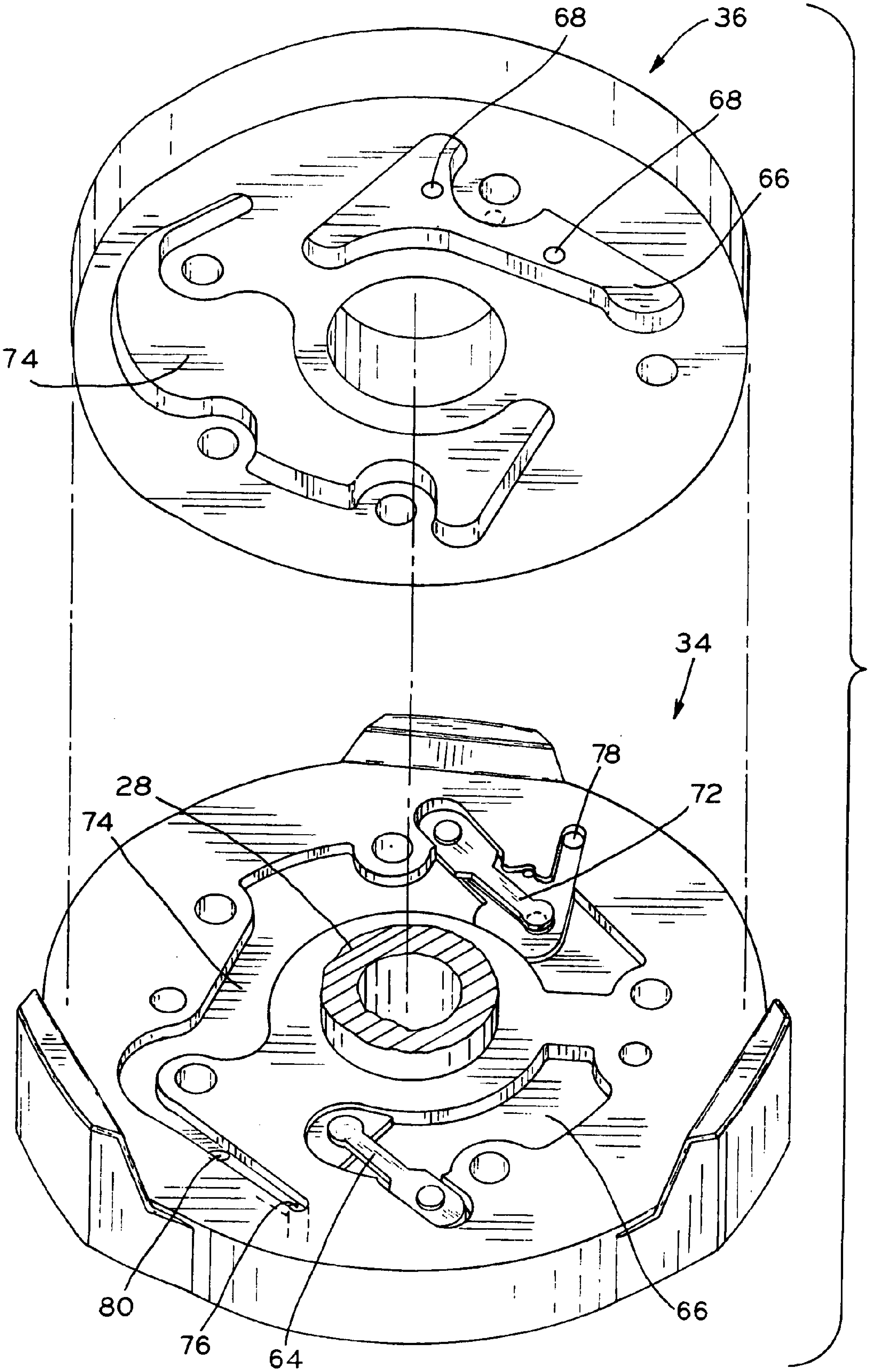

FIG. 5

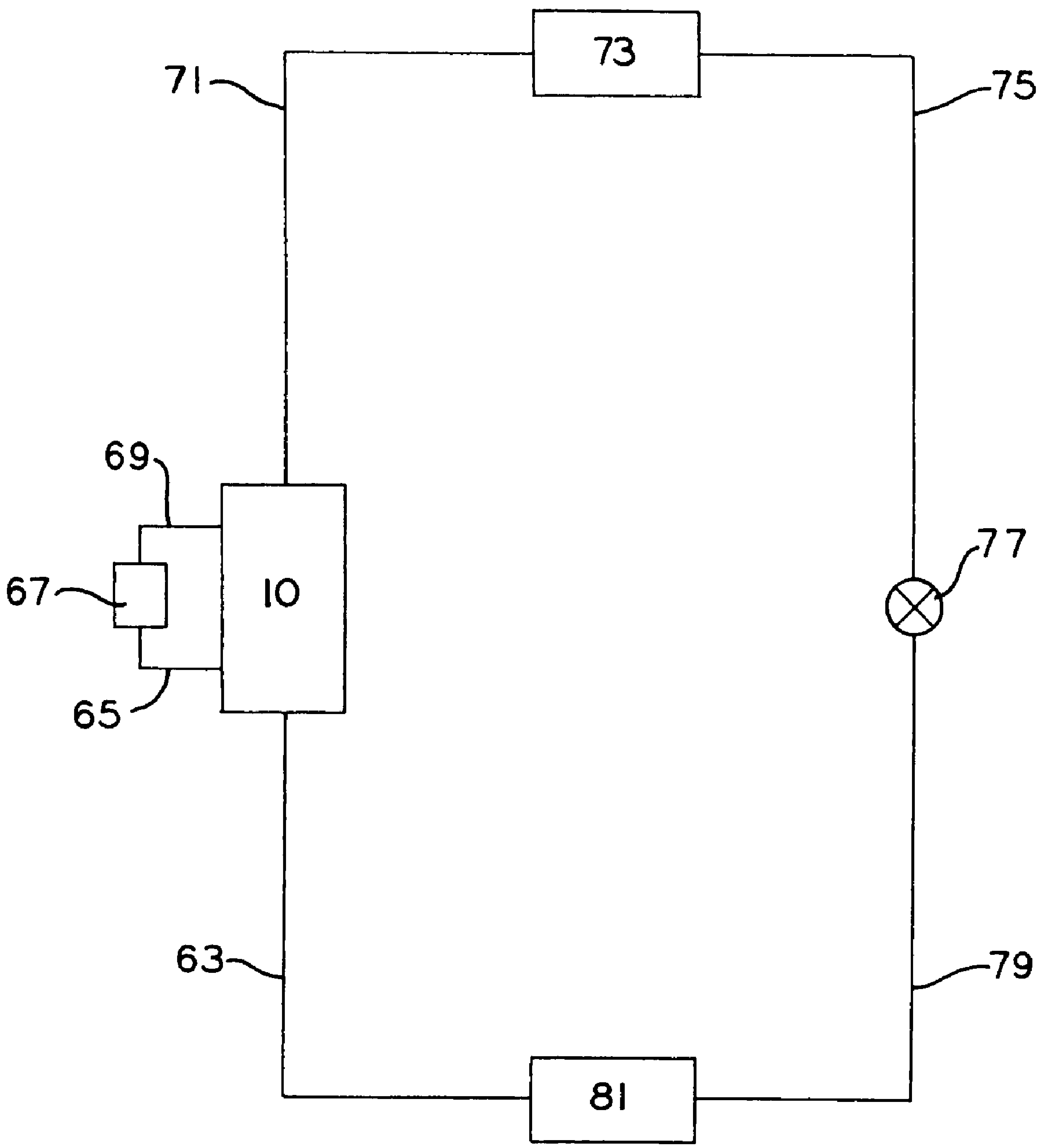

FIG. 6

TWO-STAGE ROTARY COMPRESSOR

BACKGROUND

1. Field of the Invention

The present invention relates to rotary compressors and, particularly, to two-stage rotary compressors.

2. Description of the Related Art

Rotary compressors generally include a compression mechanism mounted within a hermetic housing. An eccentric portion of a crankshaft is mounted within the compression mechanism. The crankshaft is rotated by a motor to in turn rotate a roller on the eccentric portion of the crankshaft within the compression chamber to compress a working fluid received by the compression chamber from a suction pressure to a higher discharge pressure.

In order to provide additional compression, the compression mechanism may be a two-stage compression mechanism. In a two-stage compression mechanism, the compression mechanism has two, discrete compression chambers. The first compression chamber receives working fluid at suction pressure and compresses the working fluid to an intermediate pressure. The second compression chamber then receives the previously compressed working fluid at intermediate pressure and compresses the working fluid to a higher discharge pressure. By utilizing a two-stage compression mechanism, the overall efficiency of the compressor may be increased.

SUMMARY OF THE PRESENT INVENTION

The present invention relates to rotary compressors and, particularly, to two-stage rotary compressors. In one embodiment, the present invention provides a two-stage rotary compressor having a compression mechanism including a single muffler housing member. The single muffler housing member at least partially defines both an intermediate pressure discharge cavity and a discharge pressure discharge cavity. The intermediate pressure discharge pressure cavity is in fluid communication with a first compression chamber of the compression mechanism and receives working fluid at intermediate pressure from the first compression mechanism. The discharge pressure discharge cavity is in fluid communication with a second compression chamber of the compression mechanism and receives working fluid at discharge pressure from the second compression chamber. Advantageously, the use of a single muffler housing member eliminates the need to manufacture independent muffler housing members to independently receive working fluid from the first and second compression chambers, and decreases the overall profile or height of the compression mechanism. This, in turn, reduces manufacturing and labor costs and simplifies the assembly of the compressor.

In another exemplary embodiment, the compression mechanism includes a cylinder block having a plurality of vanes positioned within slots formed in an inner cylindrical surface of the cylinder block. The vanes are biased toward the eccentric of a crankshaft received within the cylinder block to form the first and second compression chambers of the compression mechanism. In this embodiment, the muffler housing member further includes the plurality of passages in fluid communication with both the discharge pressure discharge cavity and the slots formed in the cylinder block. In one exemplary embodiment, the passages are in fluid communication with the slots at a point spaced radially outwardly from the vanes. As a result, working fluid at discharge pressure, which may be mixed with lubricating oil, is directed to the backside of the vanes to bias the vanes into firm engagement with the eccentric of the crankshaft. Additionally, the working fluid also functions to deliver oil to the backside of the vanes and decrease frictional contact between the vanes and cylinder block during reciprocation of the vanes.

In another exemplary embodiment, the cylinder block includes a plurality of passages for the delivery of working fluid to and from the cylinder block. In one exemplary embodiment, the cylinder block includes a fluid inlet for the receipt of working fluid at suction pressure, a second fluid inlet for receipt of working fluid at intermediate pressure, and an outlet in communication with one of the first and second compression chambers. In prior compressors having fluid inlets and outlets in different components of the compression mechanism, the tolerance of the components must be closely matched and the components precisely aligned in order to connect the inlets and outlets to outside tubing. This increases the cost of manufacturing the components and assembling the same. Advantageously, by providing both fluid inlets and a fluid outlet in the cylinder block, the inlets and outlet are easily positioned and aligned with the outside tubing by altering the position of a single component.

In one form thereof, the present invention provides a rotary compressor, including: a motor; a crankshaft operably coupled to the motor whereby operation of the motor rotates the crankshaft, the crankshaft having an eccentric portion; a roller positioned on the eccentric portion, the roller defining an outer cylindrical surface; a cylinder block having an inner cylindrical surface including a plurality of slots formed therein, the inner cylindrical surface defining a substantially cylindrical cavity, the eccentric portion of the crankshaft being rotatably disposed within the cylinder block, wherein the outer cylindrical surface of the roller contacts the inner cylindrical surface of the cylinder block; a first vane positioned at least partially within one of the plurality of slots of the cylinder block, the first vane biased inwardly to contact the outer cylindrical surface of the roller; a second vane positioned at least partially within another of the plurality of slots of the cylinder block, the second vane biased inwardly to contact the outer cylindrical surface of the roller; a first compression chamber defined by the first vane, the second vane, the cylinder block, and the roller, in which a working fluid is compressed from a suction pressure to an intermediate pressure; a second compression chamber defined by the first vane, the second vane, the cylinder block, and the roller, in which a working fluid is compressed from the intermediate pressure to a discharge pressure; and a single muffler housing member at least partially defining an intermediate pressure discharge cavity and a discharge pressure discharge cavity, the intermediate pressure discharge cavity in fluid communication with the first compression chamber and the discharge pressure discharge cavity in fluid communication with the second compression chamber.

In another form thereof, the present invention provides a rotary compressor, including: a motor; a crankshaft operably coupled to the motor whereby operation of the motor rotates the crankshaft, the crankshaft having an eccentric portion; a roller positioned on the eccentric portion, the roller defining an outer cylindrical surface; a cylinder block having an inner cylindrical surface including a plurality of slots formed therein, the inner cylindrical surface defining a substantially cylindrical cavity, the eccentric portion of the crankshaft being rotatably disposed within the cylinder block, wherein the outer cylindrical surface of the roller contacts the inner cylindrical surface of the cylinder block; a first vane positioned at least partially within one of the plurality of slots of the cylinder block, the first vane biased inwardly to contact the outer cylindrical surface of the roller; a second vane positioned at least partially within another of the plurality of slots of the cylinder block, the second vane biased inwardly to contact the outer cylindrical surface of the roller; a first compression chamber defined by the first vane, the second vane, the cylinder block, and the roller, in which a working fluid is compressed from a suction pressure to an intermediate pressure; a second compression chamber defined by the first vane, the second vane, the cylinder block, and the roller, in which a working fluid is compressed from the intermediate pressure to a discharge pressure; a main bearing at least partially defining a discharge pressure discharge cavity in fluid communication with the second compression chamber; and a plurality of passages in respective fluid communication with the discharge pressure cavity and with the plurality of slots of the cylinder block, wherein during operation of the compressor, working fluid at discharge pressure is communicated from the discharge cavity to the plurality of slots of the cylinder block to bias the vanes into engagement with the outer cylindrical surface of the roller.

In yet another form thereof, the present invention provides a rotary compressor, including: a motor; a crankshaft operably coupled to the motor whereby operation of the motor rotates the crankshaft, the crankshaft having an eccentric portion; a roller positioned on the eccentric portion, the roller defining an outer cylindrical surface; a cylinder block having an inner cylindrical surface including a plurality of slots formed therein, the inner cylindrical surface defining a substantially cylindrical cavity, the eccentric portion of the crankshaft being rotatably disposed within the cylinder block, wherein the outer cylindrical surface of the roller contacts the inner cylindrical surface of the cylinder block; a first vane positioned at least partially within one of the plurality of slots of the cylinder block, the first vane biased inwardly to contact the outer cylindrical surface of the roller; a second vane positioned at least partially within another of the plurality of slots of the cylinder block, the second vane biased inwardly to contact the outer cylindrical surface of the roller; a first compression chamber defined by the first vane, the second vane, the cylinder block, and the roller, in which a working fluid is compressed from a suction pressure to an intermediate pressure; a second compression chamber defined by the first vane, the second vane, the cylinder block, and the roller, in which a working fluid is compressed from the intermediate pressure to a discharge pressure; a suction pressure inlet extending through the cylinder block and in fluid communication with the first compression chamber; an intermediate pressure inlet extending through the cylinder block and in fluid communication with the second compression chamber; and an outlet extending through the cylinder block and in fluid communication with one of the first compression chamber and the second compression chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

The above-mentioned and other features and advantages of this invention, and the manner of attaining them, will become more apparent and the invention itself will be better understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

FIG. **1** is a cross-sectional view of a two-stage rotary compressor according to the present invention;

FIG. **2**A is a perspective view of the compression mechanism of the compressor of FIG. **1**;

FIG. **2**B is a perspective view of the compression mechanism of FIG. **2**A rotated 180° from the position shown in FIG. **2**A;

FIG. **3** is a cross-sectional view of the compression mechanism of FIG. **2**A, taken along line **3-3** of FIG. **2**A;

FIG. **4** is a cross-sectional view of the compression mechanism of FIG. **2**A, taken along line **4-4** of FIG. **2**A;

FIG. **5** is an exploded perspective view of the main bearing and single muffler housing member of the compression mechanism of FIG. **2**A; and

FIG. **6** is a schematic of a heating and/or cooling circuit including the compressor of FIG. **1**.

Corresponding reference characters indicate corresponding parts throughout the several views. The exemplification set out herein illustrates one preferred embodiment of the invention, in one form, and such exemplification is not to be construed as limiting the scope of the invention any manner.

DETAILED DESCRIPTION

Referring to FIG. **1**, a cross-section of compressor **10** is shown including hermetic housing **12** having main portion **14** to which upper and lower end caps **16**, **18** are connected. In one exemplary embodiment, compressor **10** is a component of a heating and/or cooling circuit, shown schematically in FIG. **6** and described in detail below, and functions to compress a working fluid, such as a refrigerant, which may be an HFC, CFC, HCFC or carbon dioxide refrigerant, for example. Motor **20** and compression mechanism **22** are positioned within hermetic housing **12**. Motor **20** includes stator **24** and rotor **26**. Crankshaft **28** is coupled to rotor **26** of motor **20**, allowing for rotation of crankshaft **28** during operation of motor **20**. Crankshaft **28** includes eccentric **30** and is rotatably supported by outboard bearing **32** and main bearing **34** of compression mechanism **22**. Muffler housing member **36** of compression mechanism **22** is positioned above main bearing **34**. Cylinder block **38** of compression mechanism **22** is positioned between outboard bearing **32** and main bearing **34**. Outboard bearing **32**, cylinder block **38**, main bearing **34**, and muffler housing member **36** may be connected together by fasteners, such as bolts.

Referring to FIG. **3**, cylinder block **38** includes inner cylindrical surface **40** defining a cylindrical cavity for receipt of eccentric **30** of crankshaft **28**. Inner cylindrical surface **40** includes slots **42**, **44** formed therein. Vanes **46**, **48** are positioned at least partially within slots **42**, **44**. Biasing members, such as springs **50**, **52**, are disposed within the slots and bias vanes **46**, **48** radially inwardly to contact outer cylindrical surface **55** of roller **54**. Roller **54** is positioned around eccentric **30** of crankshaft **28** and defines outer cylindrical surface **55**. Outer cylindrical surface **55** of roller **54** is in contact with inner cylindrical surface **40** of cylinder block **38**. During operation of compressor **10**, crankshaft **28** drives roller **54** eccentrically while maintaining constant contact with inner cylindrical surface **40** to compress a working fluid, as described in detail below.

Referring to FIG. **3**, cylinder block **38**, vanes **46**, **48**, and roller **54** cooperate to define a pair of compression chambers **56**, **58**. Compression chamber **56** is a first stage compression chamber into which working fluid at suction pressure is drawn through suction pressure inlet **60**. Suction pressure inlet **60** extends through cylinder block **38** and is in communication with opening **62** (FIG. **1**) in main portion **14** of hermetic housing **12** to receive working fluid from pipe **63**, shown schematically in FIG. **6**. Working fluid received via suction pressure inlet **60** enters compression chamber **56** and is compressed to an intermediate pressure by the rotation of eccentric **30** and roller **54**. Specifically, as eccentric **30** and roller **54** are rotated, the volume of compression chamber **56** is reduced, compressing the working fluid between vane **46**, roller **54**, and inner cylindrical surface **40** of cylinder block **38**. Once the working fluid has reached the intermediate pressure, valve **64**, shown in FIG. **5**, is forced away from main bearing **34** to allow working fluid to enter intermediate pressure discharge cavity **66** defined entirely by main bearing **34** and muffler housing member **36**. The intermediate pressure working fluid then exits compression mechanism **22** via discharge ports **68** in muffler housing member **36** and enters the interior of hermetic housing **12** of compressor **10**.

In one exemplary embodiment, shown in FIG. **6**, compressor **10** is a component of a heating and/or cooling circuit including intercooler **67**. In this embodiment, intermediate pressure working fluid exits compressor **10** via an outlet (not shown) in hermetic housing **12** and travels through pipe **65** to arrive at intercooler **67**. Intercooler **67** is used to dissipate heat from the intermediate pressure working fluid into the ambient environment, increasing the volumetric efficiency of compressor **10** during the second stage of compression, described below. Once the working fluid has been cooled by passing through intercooler **67**, the intermediate pressure working fluid passes through pipe **69** and enters into compression chamber **58** via intermediate pressure inlet **70**.

In another exemplary embodiment, intercooler **67** and pipes **65**, **69** are absent. In this embodiment, the intermediate pressure working fluid is discharged into and retained within hermetic housing **12**. The intermediate pressure working fluid is then drawn into compression chamber **58** from the interior of hermetic housing **12**. Specifically, compression chamber **58** is a second stage compression chamber into which working fluid at intermediate pressure is drawn through intermediate pressure inlet **70**. Once within compression chamber **58**, rotation of eccentric **30** and roller **54** compresses the intermediate pressure working fluid to a higher discharge pressure. Specifically, as eccentric **30** and roller **54** are rotated, the volume of compression chamber **58** is reduced, compressing the working fluid between vane **48**, roller **54**, and inner cylindrical surface **40** of cylinder block **38**. Referring to FIG. **5**, once compressed, the discharge pressure working fluid forces valve **72** away from main bearing **34** to allow the discharge pressure working fluid to enter discharge pressure discharge cavity **74**, which is entirely defined between main bearing **34** and muffler housing member **36**. Discharge pressure discharge cavity **74** is in fluid communication with passageways **76**, **78**, which are in fluid communication with slots **42**, **44** formed in cylinder block **38**, as shown in FIG. **3**.

Due to the fluid communication between discharge pressure discharge cavity **74** and slots **42**, **44**, discharge pressure working fluid is received within slots **42**, **44**. In one exemplary embodiment, passageways **76**, **78** provide working fluid to slots **42**, **44** at positions spaced radially outwardly from vanes **46**, **48**. In this embodiment, the discharge pressure working fluid exerts a force to the backside of vanes **46**, **48** to bias vanes **46**, **48** radially inwardly and into engagement with roller **54**. Due to the biasing force of the discharge pressure working fluid, in conjunction with the baising means positioned within slots **42**, **44**, vanes **46**, **48** are biased toward roller **54** with a sufficient force to maintain contact with roller **54** at substantially all times during operation of compressor **10**. As a result, any leakage of working fluid between compression chambers **56**, **58** is minimized or eliminated. Additionally, in one exemplary embodiment, oil is mixed with the working fluid. By placing oil in the working fluid, the working fluid provides lubrication to the various components of the compressor and/or other components of a heating and/or cooling circuit as it passes therethrough. Thus, the receipt of working fluid containing oil within slots **42**, **44** provides lubrication to slots **42**, **44** and, correspondingly, vanes **46**, **48**, lessening the friction experienced during reciprocation of vanes **46**, **48** within slots **42**, **44**.

In addition to passageways **76**, **78**, discharge pressure discharge cavity **74** further includes outlet **80** in fluid communication with discharge pressure outlet **82** extending through cylinder block **38**. While outlet **82** is described and depicted herein as a discharge pressure outlet, outlet **82** may be in fluid communication with intermediate pressure discharge cavity **66** and, correspondingly, compression chamber **56**, to form an intermediate discharge pressure outlet. Referring to FIG. **6**, discharge pressure working fluid exists outlet **82** and compressor **10** via an outlet (not shown) in hermetic housing **12**, and travels therethrough to condenser **73**. As discharge pressure working fluid travels through condenser **73**, heat is released from the discharge pressure working fluid into the ambient environment as the working fluid changes phase from a gas to a liquid. As the working fluid exits condenser **73** it passes through pipe **75** and travels through expansion valve **77**, where the pressure of the working fluid is reduced. The working fluid then travels through pipe **79** to arrive at evaporator **81**. As the working fluid travels through evaporator **81**, it absorbs heat from the ambient environment and is vaporized, changing back to the gas phase. Once in the gas phase, the working fluid is drawn through pipe **63** passing through opening **62** in hermetic housing **12** to arrive at suction pressure inlet **60**. Once received through suction pressure inlet **60**, the working fluid is compressed by compression mechanism **22**, as described in detail above, and the process repeated.

While this invention has been described as having a preferred design, the present invention can be further modified within the spirit and scope of this disclosure. This application is therefore intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains and which fall within the limits of the appended claims.

What is claimed is:

1. A rotary compressor, comprising:

an outer hermetic housing defining an interior space;

a motor;

a crankshaft operably coupled to said motor whereby operation of said motor rotates said crankshaft, said crankshaft having an eccentric portion;

a roller positioned on said eccentric portion, said roller defining an outer cylindrical surface;

a cylinder block having an inner cylindrical surface including a plurality of slots formed therein, said inner cylindrical surface defining a substantially cylindrical cavity, said eccentric portion of said crankshaft being rotatably disposed within said cylinder block, wherein said outer cylindrical surface of said roller contacts said inner cylindrical surface of said cylinder block;

a first vane positioned at least partially within one of said plurality of slots of said cylinder block, said first vane biased inwardly to contact said outer cylindrical surface of said roller;

a second vane positioned at least partially within another of said plurality of slots of said cylinder block, said second vane biased inwardly to contact said outer cylindrical surface of said roller;

a first compression chamber defined by said first vane, said second vane, said cylinder block, and said roller, in which a working fluid is compressed from a suction pressure to an intermediate pressure;

a second compression chamber defined by said first vane, said second vane, said cylinder block, and said roller, in which a working fluid is compressed from the intermediate pressure to a discharge pressure; and

a muffler housing member disposed on only one axial side of said cylinder block and at least partially defining an intermediate pressure discharge cavity and a discharge pressure discharge cavity, said intermediate pressure discharge cavity in fluid communication with said first compression chamber and said discharge pressure discharge cavity in fluid communication with said second compression chamber, said intermediate pressure discharge cavity and said discharge pressure discharge cavity being disposed on said one axial side of said cylinder block and being separate from the interior space of the hermetic housing.

2. The rotary compressor of claim **1**, wherein said intermediate pressure discharge cavity is in fluid communication with said interior of said hermetic housing.

3. The rotary compressor of claim **1**, and including a bearing disposed on said one axial side of said cylinder block and defining with said muffler housing member said intermediate pressure discharge cavity and said discharge pressure discharge cavity.

4. The rotary compressor of claim **3**, wherein said bearing and said muffler housing member define the entirety of said intermediate discharge pressure cavity and said discharge pressure discharge cavity.

5. A rotary compressor, comprising:

a motor;

a crankshaft operably coupled to said motor whereby operation of said motor rotates said crankshaft, said crankshaft having an eccentric portion;

a roller positioned on said eccentric portion, said roller defining an outer cylindrical surface;

a cylinder block having an inner cylindrical surface including a plurality of slots formed therein, said inner cylindrical surface defining a substantially cylindrical cavity, said eccentric portion of said crankshaft being rotatably disposed within said cylinder block, wherein said outer cylindrical surface of said roller contacts said inner cylindrical surface of said cylinder block;

a first vane positioned at least partially within one of said plurality of slots of said cylinder block, said first vane biased inwardly to contact said outer cylindrical surface of said roller;

a second vane positioned at least partially within another of said plurality of slots of said cylinder block, said second vane biased inwardly to contact said outer cylindrical surface of said roller;

a first compression chamber defined by said first vane, said second vane, said cylinder block, and said roller, in which a working fluid is compressed from a suction pressure to an intermediate pressure;

a second compression chamber defined by said first vane, said second vane, said cylinder block, and said roller, in which a working fluid is compressed from the intermediate pressure to a discharge pressure;

a muffler housing member at least partially defining an intermediate pressure discharge cavity and a discharge pressure discharge cavity, said intermediate pressure discharge cavity in fluid communication with said first compression chamber and said discharge pressure discharge cavity in fluid communication with said second compression chamber; and

a bearing at least partially defining said intermediate pressure discharge cavity and said discharge pressure discharge cavity.

6. The rotary compressor of claim **5**, wherein said bearing and said muffler housing member define the entirety of said intermediate discharge pressure cavity and said discharge pressure discharge cavity.

7. The rotary compressor of claim **5**, wherein said bearing further comprises a plurality of passageways, each of said plurality of passageways in fluid communication with a respective one of said plurality of slots in said cylinder block.

8. A rotary compressor, comprising:

a motor;

a crankshaft operably coupled to said motor whereby operation of said motor rotates said crankshaft, said crankshaft having an eccentric portion;

a roller positioned on said eccentric portion, said roller defining an outer cylindrical surface;

a cylinder block having an inner cylindrical surface including a plurality of slots formed therein, said inner cylindrical surface defining a substantially cylindrical cavity, said eccentric portion of said crankshaft being rotatably disposed within said cylinder block, wherein said outer cylindrical surface of said roller contacts said inner cylindrical surface of said cylinder block;

a first vane positioned at least partially within one of said plurality of slots of said cylinder block, said first vane biased inwardly to contact said outer cylindrical surface of said roller;

a second vane positioned at least partially within another of said plurality of slots of said cylinder block, said second vane biased inwardly to contact said outer cylindrical surface of said roller;

a first compression chamber defined by said first vane, said second vane, said cylinder block, and said roller, in which a working fluid is compressed from a suction pressure to an intermediate pressure;

a second compression chamber defined by said first vane, said second vane, said cylinder block, and said roller, in which a working fluid is compressed from the intermediate pressure to a discharge pressure;

a main bearing at least partially defining a discharge pressure discharge cavity in fluid communication with said second compression chamber;

a hermetic housing defining an interior space at a pressure lower than discharge pressure, said discharge pressure discharge cavity being fluidly isolated from said housing interior space; and

a plurality of passages in respective fluid communication with said discharge pressure discharge cavity and with said plurality of slots of said cylinder block, wherein during operation of the compressor, working fluid at discharge pressure is communicated from said discharge pressure discharge cavity to said plurality of slots of said cylinder block to bias said vanes into engagement with said outer cylindrical surface of said roller.

9. The rotary compressor of claim **8**, wherein said plurality of passages extend through said main bearing.

10. The rotary compressor of claim **8**, further comprising a muffler housing member at least partially defining said discharge pressure discharge cavity, wherein said muffler housing member and said main bearing define the entirety of said discharge pressure discharge cavity.

11. The rotary compressor of claim **8**, further comprising a discharge pressure outlet in fluid communication with said discharge pressure discharge cavity.

12. The rotary compressor of claim **11**, wherein said discharge pressure outlet extends through said cylinder block.

13. A rotary compressor, comprising:

a motor;

a crankshaft operably coupled to said motor whereby operation of said motor rotates said crankshaft about an axis, said crankshaft having an eccentric portion;

a roller positioned on said eccentric portion, said roller defining an outer cylindrical surface;

a cylinder block having an inner cylindrical surface including a plurality of slots formed therein, said inner cylindrical surface defining a substantially cylindrical cavity, said eccentric portion of said crankshaft being rotatably disposed within said cylinder block, wherein said outer cylindrical surface of said roller contacts said inner cylindrical surface of said cylinder block;

a first vane positioned at least partially within one of said plurality of slots of said cylinder block, said first vane biased inwardly to contact said outer cylindrical surface of said roller;

a second vane positioned at least partially within another of said plurality of slots of said cylinder block, said second vane biased inwardly to contact said outer cylindrical surface of said roller;

a first compression chamber defined by said first vane, said second vane, said cylinder block, and said roller, in which a working fluid is compressed from a suction pressure to an intermediate pressure;

a second compression chamber defined by said first vane, said second vane, said cylinder block, and said roller, in which a working fluid is compressed from the intermediate pressure to a discharge pressure;

an elongate suction pressure inlet extending radially through said cylinder block and in fluid communication with said first compression chamber;

an elongate intermediate pressure inlet extending radially through said cylinder block and in fluid communication with said second compression chamber; and

an elongate outlet extending radially through said cylinder block and in fluid communication with one of said first compression chamber and said second compression chamber.

14. The rotary compressor of claim **13**, wherein said outlet is in fluid communication with said second compression chamber.

15. The rotary compressor of claim **13**, wherein said outlet is in fluid communication with said first compression chamber.

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